

NATURAL RESOURCES CONSERVATION SERVICE**CONSERVATION PRACTICE STANDARD****VERTICAL DRAIN**

(no.)

CODE 630**DEFINITION**

A well, pipe, pit, or bore into porous, underground strata into which drainage water can be discharged.

PURPOSE

To provide an outlet for drainage water from a surface or subsurface drainage system.

CONDITIONS WHERE PRACTICE APPLIES

This practice is applicable in locations where the underlying strata, usually Aa or cinders, can transmit or store drainage flow, and other drainage outlets are not available and cannot be provided at a reasonable cost. The practice is applicable only in locations where a determination has been made that it is not contrary to state laws or regulations, and it will not cause pollution of underground waters.

CRITERIA

The number and size of vertical drains shall be adequate to discharge the design drainage flow into the underlying stratum or strata. The design drainage flow shall be consistent with design frequency of the practice using the vertical drain for an outlet. For example, the design drainage flow would be based on a drainage coefficient for a natural ponding area, a 10-year frequency peak discharge for a diversion outlet, or by routing the design storm through a reservoir into the outlet. The discharge of a vertical drain is dependent upon the drain size and depth and on the permeability, porosity, thickness, and extent of the underlying

strata. An estimate of discharge capacity may be determined by using the Hawaii Supplement to Chapter 14 of the Engineering Field Manual (EFM) on Vertical Drain Design.

Vertical drains may be either wells or pits. The minimum diameter cased well shall be 4 inches and shall be of adequate strength and longevity to serve planned needs. The minimum diameter pit shall be 24 inches and may be open or rock-filled. The rockfill shall be placed in layers so that large stones are at the bottom and smaller rock fragments near the top. There shall be at least 12 inches of gravel (3/8 inch maximum), cinders, or coarse sand at the top of the drain. All fill material shall be hard and durable and shall not

contain organic material or soil. The open pit vertical drains shall be provided with a desilting basin or other means for the removal of coarse-grained sediment from the water before entering the pit.

PLANNING CONSIDERATIONS FOR WATER QUANTITY AND QUALITY**Water Quantity**

1. Effect on aquifer recharge.
2. Effect on the water table.
3. The effect on the volume of downstream flow to downstream users and uses.

Water Quality

1. The potential hazard to ground water quality from the discharge of drainage water containing dissolved substances.

2. The potential for land use changes that may impair aquifer quality.

CONSTRUCTION PLANS

Plans for installation of vertical drains shall be in keeping with this standard, and shall describe the requirements for proper installation of the practice to achieve its intended purpose.

The construction plans should include the depth and diameter of the drain and the

maximum water elevation. If a stand pipe and trash rack are to be used for removing sediment, the dimensions and material requirements shall be shown on the plans. If a graded filter is used in the subsurface drain for sediment control, the filter materials should be specified in the plans.

The plans for a subsurface drain may be incorporated into the plans for the structure that it serves as an outlet.